Adaptive Contention- and Content-Aware 3D Object Detection for Embedded GPUs

Adaptive 3D detection for autonomous systems, balancing accuracy and latency on embedded GPUs.

Researchers at Purdue University have developed AGILE3D, a cutting-edge 3D object detection system designed for autonomous applications such as self-driving vehicles and drones. AGILE3D is the first adaptive, contention- and content-aware 3D object detection system tailored for embedded GPUs. The system can dynamically adjust detection strategies based on real-time hardware constraints and varying input data. Moreover, AGILE3D enhances detection accuracy and system efficiency by maintaining high performance even under resource contention, combating the common pitfalls associated with 3D LiDAR data processing. While several solutions exist for optimizing 3D detection systems, AGILE3D is remarkable due to its adaptive nature, real-time optimization, and ability to seamlessly operate across a wide range of embedded platforms without compromising accuracy or latency.

Technology Validation:

Comprehensive evaluations show that Agile3D achieved state-of-the-art performance, maintaining high accuracy across varying hardware contention levels and latency budgets of 100-500 ms. On NVIDIA Orin and Xavier GPUs, it consistently leads the Pareto frontier, outperforming existing methods for robust, efficient 3D object detection.

Advantages:

-Energy-efficient and cost-effective

-Balances accuracy and latency under dynamical conditions

-Compatible with mobile GPUs from NVIDIA

Applications:

-Autonomous/Self-Driving Vehicles

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Category
Aerospace & Defense/Autonomous Systems (UAVs & AVs)
Robotics & Automation/Autonomous Systems & Perception AI

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-Security Systems

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